CLAIMS

WHAT IS CLAIMED IS:

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Sub. a1

1. A method of delivering a polynucleotide preferentially to a specified region of a respiratory tract in a mammalian subject, comprising:

(a) aerosolizing a formulation comprising a polynucleotide, thereby forming aerosolized particles having an aerodynamic diameter related to the diameter of airways in an area of a respiratory tract;

(b) inhaling the aerosol into the respiratory tract of the subject, wherein the aerodynamic diameter of the particles target the particles to the specified region of the respiratory tract.

2. The method of claim 1, wherein the aerodynamic diameter of the particles is in the range of 1-3 μm, and the specified region of the respiratory tract is the alveoli.

3. The method of claim 1, wherein the aerodynamic diameter of the particles is in the range of 4-6 μm, and the specified region of the respiratory tract is the central airways.

4. The method of claim 1, wherein the aerodynamic diameter of the particles is in the range of 7-10 μm, and the specified region of the respiratory tract is the upper respiratory tract.

5. The method of claim 1, wherein the polynucleotide is DNA.

6. The method of claim 5, wherein the DNA is complexed with a lipid-based delivery vehicle.

7. The method of claim 6, wherein the lipid based delivery vehicle is a cationic lipid.

8. The method of claim 1, wherein the formulation is an aqueous solution and the method further comprises heating in an amount significant to evaporate water away from the solution thereby adjusting particles.

9. The method of claim 8, wherein the specific region of respiratory tract is further targeted by adjusting the volume of air inhaled with the aerosol.

10. The method of claim 1, wherein the formulation is a dry powder.

11. The method of claim 10, wherein the specific region of respiratory tract is further targeted by adjusting the volume of air inhaled with the aerosol.

12. The method of claim 1, wherein the formulation is aerosolized by being moved through a porous membrane.

13. The method of claim 12, wherein pores of the membrane have a diameter in the range of from 0.25 to 1.0 microns.

14. The method of claim 12, wherein pores of the membrane have a diameter in the range of from 1.25 to 2.0 microns.

15. The method of claim 12, wherein pores of the membrane have a diameter in the range of from 2.25 microns to 3.0 microns.

16. The method of claim 1, wherein particle size is controlled by heating the aerosol.

17. A method of delivering a polynucleotide preferentially to a specified region of a respiratory tract in a mammalian subject comprising:

(a) determining an inspiratory volume of the subject;

(b) aerosolizing a formulation comprising a polynucleotide, thereby forming aerosolized particles having an aerodynamic diameter related to the diameter of airways in an area of a respiratory tract of the subject;

(c) inhaling the aerosolized particles into the respiratory tract of the subject, wherein the aerodynamic size of the particles is related to the diameter of airways in the specified region of the respiratory tract; and

(d) repeatedly aerosolizing the polynucleotide formulation at the same determined inspiratory volume.

18. The method of claim 17, wherien the volume is determined by coaching the subject to inhale a given amount.

19. The method of claim 17, wherein the volume is determined by measuring airflow electronically.

20. A method of delivering a polynucleotide preferentially to a specified region of a respiratory tract in a mammalian subject, comprising:

(a) aerosolizing a liquid formulation comprising a polynucleotide and a lipid carrier, thereby forming aerosolized particles having an aerodynamic diameter related to the diameter of airways in an area of a respiratory tract of the subject;

(b) inhaling the aerosol into the respiratory tract of the subject, wherein the aerodynamic diameter of the particles targets the particles to the specified region of the respiratory tract.